

What is claimed is:

1. An aerosolization apparatus comprising:
a housing defining a chamber having one or more air inlets, the chamber
5 being sized to receive a capsule which contains an aerosolizable pharmaceutical formulation;
a puncturing mechanism within the housing, the puncturing mechanism
comprising an alignment guide and a puncture member, wherein the alignment guide comprises a
surface adapted to contact the capsule while the puncture member is advanced into the capsule to
create an opening in the capsule, and wherein at least a portion of the surface is sloped at an angle
10 which is less than 55 degrees relative to the longitudinal axis of the capsule; and
an end section associated with the housing, the end section sized and shaped
to be received in a user's mouth or nose so that the user may inhale through the end section to
inhale aerosolized pharmaceutical formulation that has exited the capsule through the opening
created in the capsule.
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2. An aerosolization apparatus according to claim 1 wherein the surface is
sloped at an angle which is from 35 to 55 degrees relative to the longitudinal axis of the capsule.
3. An aerosolization apparatus according to claim 1 wherein the surface is
20 sloped at an angle which is from 37 to 50 degrees relative to the longitudinal axis of the capsule.
4. An aerosolization apparatus according to claim 1 wherein the surface is
sloped at an angle of about 45 degrees relative to the longitudinal axis of the capsule.
- 25 5. An aerosolization apparatus according to claim 1 wherein the puncturing
mechanism is at least partially within the chamber.
6. An aerosolization apparatus according to claim 1 wherein surface comprises
a passageway and wherein the puncture member slides within the passageway.
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7. An aerosolization apparatus according to claim 1 wherein the wherein the surface is sloped at an angle which less than 55 degrees relative to the longitudinal axis of the puncture member.

5 8. An aerosolization apparatus according to claim 1 wherein the wherein the surface is sloped at an angle which less than 55 degrees relative to the longitudinal axis of the chamber.

10 9. An aerosolization apparatus according to claim 1 wherein the wherein the surface is sloped at an angle which less than 55 degrees relative to an inhalation direction.

10. An aerosolization apparatus according to claim 1 wherein the surface is moveable within the chamber.

15 11. An aerosolization apparatus according to claim 10 wherein the wherein the surface is sloped at an angle which less than 55 degrees relative to the direction of movement of the surface.

20 12. An aerosolization apparatus according to claim 1 wherein the surface comprises one or more protrusions and wherein the one or more protrusions are adapted to contact the capsule.

25 13. An aerosolization apparatus according to claim 12 wherein the protrusions are ribs.

14. An aerosolization apparatus according to claim 1 wherein the end section is removably connected to the housing and wherein the end section may be removed from the housing to provide access to the chamber.

30 15. An aerosolization apparatus according to claim 1 wherein the puncture mechanism comprises a pair of puncture members.

16. An aerosolization apparatus according to claim 1 wherein the puncture member is adapted to puncture only one end of the capsule.

5 17. An aerosolization apparatus according to claim 1 wherein the chamber is elongated and wherein the capsule is received lengthwise within the elongated chamber.

18. An aerosolization apparatus according to claim 1 wherein the width of the chamber is less than the length of the capsule.

10 19. An aerosolization apparatus according to claim 1 wherein the inlet is shaped to create a swirling airflow within the chamber.

15 20. An aerosolization apparatus comprising:
a housing defining a chamber having one or more air inlets, the chamber being sized to receive a capsule which contains an aerosolizable pharmaceutical formulation;
a puncturing mechanism within the housing, the puncturing mechanism comprising an alignment guide and a puncture member, wherein the alignment guide comprises a surface adapted to contact the capsule while the puncture member is advanced into the capsule to
20 create an opening in the capsule, and wherein the surface comprises one or more protrusions for contacting the capsule; and
an end section associated with the housing, the end section sized and shaped to be received in a user's mouth or nose so that the user may inhale through the end section to inhale aerosolized pharmaceutical formulation that has exited the capsule through the opening
25 created in the capsule.

21. An aerosolization apparatus according to claim 20 wherein the protrusions comprise one or more ribs.

30 22. An aerosolization apparatus according to claim 21 wherein the one or more ribs extend longitudinally.

23. An aerosolization apparatus according to claim 20 wherein the protrusions comprise one or more bumps.

5 24. An aerosolization apparatus according to claim 20 wherein the surface comprises a low friction material.

25. An aerosolization apparatus according to claim 24 wherein the low friction material is polytetrafluoroethylene.

10 26. An aerosolization apparatus according to claim 25 wherein at least a portion of the surface is sloped at an angle which is less than 55 degrees relative to the longitudinal axis of the capsule.

15 27. An aerosolization apparatus according to claim 20 wherein surface comprises a passageway and wherein the puncture member slides within the passageway.

28. An aerosolization apparatus according to claim 20 wherein the inlet is shaped to create a swirling airflow within the chamber.

20 29. A method of providing access to an aerosolizable pharmaceutical formulation, the method comprising:
providing a capsule containing an aerosolizable pharmaceutical formulation;
contacting the capsule with the surface of an alignment guide, the surface
25 being sloped at an angle which is less than 55 degrees relative to the longitudinal axis of the capsule; and

advancing a puncture member through the wall of the capsule to create an opening in the capsule.

30 30. A method according to claim 29 wherein the puncture member is advanced through a passageway in the surface.

31. A method of providing access to an aerosolizable pharmaceutical formulation, the method comprising:

5 providing a capsule containing an aerosolizable pharmaceutical formulation;

 contacting the capsule with the surface of an alignment guide, the surface comprising one or more protrusions for contacting the capsule; and

 advancing a puncture member through the wall of the capsule to create an opening in the capsule.

10 32. A method according to claim 31 wherein the puncture member is advanced through a passageway in the surface.

33. A method of aerosolizing a pharmaceutical formulation, the method comprising:

15 inserting a capsule containing an aerosolizable pharmaceutical formulation in a chamber;

 contacting the capsule with the surface of an alignment guide, the surface being sloped at an angle which is less than 55 degrees relative to the longitudinal axis of the capsule and/or having one or more protrusions for contacting the capsule;

20 advancing a puncture member through the wall of the capsule to create an opening in the capsule;

 aerosolizing the pharmaceutical formulation in the capsule by flowing air through the chamber; and

 administering the aerosolized pharmaceutical formulation to the respiratory

25 tract of a user during the user's inhalation.

34. A method according to claim 33 wherein the user's inhalation causes the air to flow through the chamber.